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FS NO. 103

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Item 2655 - Magnesium

A. DESCRIPTION

Magnesium is the lightest metal that is stable under ordinary conditions and produced in quantity. It is produced by the ferrosilicon and electrolytic processes, both of which require large amounts of electric current. It is approximately two-thirds the weight of aluminum. It has the unique quality of light weight coupled with high strength, excellent machinability and good workability at comparatively low temperatures.

Magnesium ingot is marketed 99.9% pure, but is usually alloyed with aluminum and small amounts of other metals and minerals before it is used. The alloys are used for parts where lightness and strength are needed, especially in aircraft and transportation equipment. It is also a constituent in many aluminum alloys. It is used to manufacture aircraft engines and airframes, for radar and radio equipment, and weapons, for automotive parts, truck bodies, household equipment such as ladders and tools and many other industrial and military uses. As powder it is used for tracer bullets, pyrotechnics and flashlight powder.

Level of Technology - The technology of magnesium production either by the ferrosilicon process or by the electrolytic method requires skilled chemical, electrical, and metallurgical engineers. While the principles involved, including considerable detail, are now a matter of public record and are readily available, there is no substitute for practical experience. Considerable development work is also involved.

B. STRATEGIC SIGNIFICANCE

All military and commercial airplanes manufactured in this country and abroad contain many magnesium parts in fuselage and accessories. Landing wheels constitute one of the principal uses for magnesium in aircraft. This is an application where light weight, high strength-weight ratio, reduced machining costs and ability to absorb shock all contribute to the choice of magnesium for airplane landing wheels ranging in size from large sand-cast wheels for bombers down to small die-cast wheels for personal planes. Magnesium forgings are frequently used in the structural parts of aircraft and such applications as engine bearing caps, bearing housings, locater arm supports, miscellaneous control brackets and levers, valve and pump bodies, and hydraulic cylinders. Magnesium extrusions find extensive use in airplanes for such parts as floor beams, doors, moldings, stiffener elements and as framework for seats. Airplane wing tips and ailerons are made for magesium sheet. Other instances where magnesium sheet is used to advantage in aircraft construction include formed wheel fairings and dust covers, oil, fuel and de-icing fluid tanks and ducts.

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Magnesium is used by the Atomic Energy Commission as an essential element in its processes. Approximate AEC requirements are at the annual rate of about 4.4 million pounds.

Other Strategic Uses - Magnesium is added to aluminum to produce die-casting alloy. It is also used for the manufacture of pyrotechnics; deoxidizing and desulfurizing of iron and steel; the production of titanium metal by the Kroll process; cathodic protection of petroleum pipe lines storage tanks, and underwater installations; and production of industrial aircraft and transportation equipment. It also has many chemical and metallurgical uses.

Strategic Materials or Equipment Required for Production - A very important requirement is the large amount of electrical power required - 10 KW for one pound of magnesium. Corrosion-resistant steel equipment for handling the chlorine, and graphite and carbon electrodes are also required.

C. SOURCES OF SUPPLY OUTSIDE THE SOVIET BLOC

1. Non-Soviet Production - Major producers of Magnesium metal are:

Country	1951 Metric Tons	1952 Metric Tons
United States	37,100	95,999
United Kingdom	7,700	4,800
Canada	4,000	5,000(est)
France	875	1,090
Italy	125(estimated)	976
Norway	120	1,300
Switzerland	---	300

In Italy production of magnesium was resumed in 1950 and the total 1950-51 production was approximately 250 metric tons. Potential production capacity is estimated at 2,000 metric tons. There was no magnesium production in Norway from 1946 through 1950. A plant at Heroya started production in 1951, financed by ERP funds.

2. Difference in Quality Production - There are no significant differences in this metal production in the various countries.

3. Exports to Soviet Bloc:

Available export statistics do not show any exports of magnesium to the Soviet Bloc during 1952 or Jan.-June, 1953. Several European countries, however, report their exports in the general category "Nonferrous Metals and Minerals" which makes identification of specific items impossible.

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4. U.S. Exports to Friendly Countries which Export to Soviet Bloc.

U.S. exports to principal European countries are as follows:

Magnesium Metal and Alloys

(Includes powder)

lbs.

	1951	1952	1953 1/
Belgium	16,500	6,650	8,245
Denmark	527	0	0
Germany, West	21,909	134,648	2,898,386
Sweden	0	183,429	295,181
Switzerland	1,150	220,502	0
United Kingdom	0	332,141	2,304
Norway	0	0	8,800
Netherlands	0	0	4,385

1/ Jan.-Sept.

D. PRIOR YEARS CONTROL

1. Global Quota for 1953 was 14,000 kgs.

2. Individual Country Quotas:

France	8000 kgs.
Italy	100 kgs.
U.K.	5000 kgs.
Unallocated Reserve	900 kgs.

3. Licensing Guide:

Insofar as practicable, exports of semi-manufactured products as shown in paragraph (d) of the definition should be avoided.

E. SOVIET NEEDS AND AVAILABILITIES

The information contained in the "Black Book" has been attached as the best information available.

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"By mid-1952 the USSR will probably be able to meet its normal peacetime requirements for all types of magnesium metal, alloys and semi-manufactured products. The European satellites are apparently short of magnesium, as evidenced by their attempts to buy in Western Europe, and this shortage would probably increase if exports from the West were eliminated. The satellites customarily have been dependent largely on imports from the West for their own supply.

"Current production of magnesium in the Soviet Orbit is certainly not adequate to meet the expanded requirements of a full-scale war without imports from outside the orbit. The USSR's productive capacity in magnesium was insufficient to meet war-time requirements during World War II and a large part of its supply was imported under lend-lease. In addition, about half of the magnesium plant facilities of the Soviet Union were destroyed or seriously damaged during that war. It is thought that the rebuilding of these facilities may have not been completed to date, and that many of the production increases scheduled for the 1946-50 five year plan were not attained and may not be reached for another year. Until that time, imports from outside the orbit, although small, may be particularly important to the Soviet Union. Moreover, even after relative self-sufficiency is attained, some imports of semi-manufactured magnesium products may be important from time to time in order to supplement production in the Soviet orbit or to alleviate special shortages.

"The Soviet bloc is believed to be self-sufficient in reserves of magnesium raw materials, and there appears to be no especially difficult problems which might prevent increases in the processing of raw materials when there is greater productive capacity in magnesium metal and alloy plants. However, some precision equipment and considerable labor skill is involved in the production of magnesium ribbons, sheets and extruded forms. Difficulties in the production of some of these items might possibly increase during a full-scale war, thus making it desirable to develop stockpile reserves at the present time.

"Present exports of magnesium metal, alloys and semi-manufactured products from the West to the Soviet orbit are believed to be small. However, reliable data on this subject are lacking."